CHAPTER II

INTRODUCTION AND BACKGROUND

Chapter II includes two sections:

- Introduction to the 1998 State Water Quality Inventory Report
- Background describing the water resources of New Jersey

Introduction To The 1998 State Water Quality Inventory Report

The *New Jersey 1998 State Water Quality Inventory Report*, commonly referred to as the 305(b) report, is the thirteenth in a series of State Water Quality Inventory Reports that have been prepared by the New Jersey Department of Environmental Protection (NJDEP) since 1975. The State Water Quality Inventory Report is prepared every two years, pursuant to Section 305(b) of the Federal Clean Water Act (P.L. 95-217).

The Water Quality Inventory Report serves to inform water managers, citizens and Congress about water quality status and trends and implementation of water management programs. At one time, the Water Quality Inventory Report was the major avenue for providing water resources information to the public. However, with the development and implementation of a Results-Based Management System, this report is one of many sources of water resources information. In addition to the Water Quality Inventory Report, the following sources of information are available:

The **New Jersey Department of Environmental Protection Strategic Plan** identifies key environmental milestones and major new and enhanced strategies that will be emphasized in the next four years to achieve those milestones. (NJDEP, 1998)

The NEPPS **Performance Partnership Agreement** is more detailed than the Strategic Plan, including environmental goals, milestones, objectives and indicators. In addition, strategies to achieve the milestones are comprehensively identified. Currently, Performance Partnership Agreements between NJDEP and EPA Region II are developed every 2 years. (NJDEP, 1996, 1997, 1999)

The **New Jersey's Environment 1998** provides an easy to read overview of the state of New Jersey's environment, including water resources, using environmental indicators. State of the Environment reports will be developed every 2 years. (NJDEP, 1998a)

The **Environmental Indicators Technical Report** provides technical reports for indicators included in the Performance Partnership Agreement. Indicators for air, fresh surface water quality, drinking water quality, pollution prevention and multi-media indicators for mercury were

published in 1998. (NJDEP, 1998b). Additional indicator reports are being planned.

The **NJDEP Annual Report** provides an overview of environmental conditions and programmatic progress over the previous year. (NJDEP, 1998c)

Watershed Characterization and Assessment Reports are being developed for New Jersey's watershed management areas. Initially, these reports are used to summarize status and trends of key water resources issues using readily available NJDEP data. Through the Public and Technical Advisory Committees established during the Watershed Management process, partner data and assessments will be integrated. These reports provide a very detailed discussion of water resources. Currently reports are being drafted for WMAs 6, 19, and 12. (NJDEP, 1998d, 1999a and 1999b). Additional reports are being planned.

The **Annual Clean Water Enforcement Act Report** provides status and trends in compliance at permitted facilities. (NJDEP, 1999c)

New Jersey's Water Quality Inventory Report is incorporated into a national report prepared by the United States Environmental Protection Agency (EPA). This National Water Quality Inventory Report is then submitted to Congress. New Jersey's Water Quality Inventory report, therefore, informs national policy regarding water pollution control mandates and priorities. To facilitate preparation of the National Report to Congress, designated use attainment assessments and source and cause assessment results were submitted to EPA electronically.

This 1998 Water Quality Inventory Report, as per EPA's 1997 *Guidelines for the Preparation of the 1998 State Water Quality Assessments*, is an abbreviated report that provides specific new information not presented in the 1996 Report (NJDEP, 1996a) and relevant updates to information reported in 1996**.** (EPA, 1997)**.** The 1996 edition of the report focused on detailed statewide water quality assessments using chemical/physical/sanitary data collected between 1991 and 1995, inclusive, and biological assessments employing benthic macroinvertebrate communities.

This 1998 Report includes information up to the end of 1998 and addresses the following topics:

- Designated use attainment status is summarized from the *1996 NJ Water Quality Inventory Report.*

- Detailed preliminary assessments of the Passaic River Basin (Watershed Management Areas 3, 4 and 6) and the Rancocas/Pennsauken/Cooper River Basins (Watershed Management Area 19) regarding the suspected point and nonpoint sources and potential and known chemical causes of water quality impairment. See Figure II-1 for a map of New Jersey's Watershed Management Areas

- Summaries of natural ground water quality underlying Watershed Management Area 6

(WMA6) and general ground water quality underlying WMA 19.

- Updated descriptions of the Department's principal water quality monitoring programs, including a redesigned surface water quality monitoring network and planned improvements to the ground water quality monitoring network.

This Report contains the following five chapters.

Chapter I - Executive Summary and Recommendations summarizes the findings of Report and recommendations for continued improvements in water quality.

Chapter II - Introduction and Background introduces the Report and the water resources of the state.

Chapter III - Surface Water Assessment summarizes statewide water resource use attainment as presented in the 1996 Inventory Report. Chapter III includes a summary of a preliminary assessment of the known and potential chemical causes of water quality impairment and the suspected point and nonpoint pollution sources in four Watershed Management Areas: Passaic River Basin (WMAs 3, 4 and 6) and the Rancocas/Pennsauken/Cooper River Basins (WMA 19).

Chapter IV - Ground Water Quality and Management is a general discussion of natural or background ground water quality in WMAs 6 and 19. A description of a proposed ground water monitoring strategy and network is also included.

Chapter V - Surface Water Monitoring, Assessment and Pollution Control Programs. This chapter presents the State's surface water quality monitoring activities. New Jersey's TMDL schedule and New Jersey's approach to comprehensively assess waters of the state.

Appendix- The Appendix includes a detailed description of the methodology used to conduct the preliminary assessment of chemical causes of water quality impairment and suspected point and nonpoint pollutant sources; an example preliminary source and cause assessment for the Whippany River Watershed; and the preliminary source and cause assessments for watersheds in four Watershed Management Areas.

Background: New Jersey's Water Resources

New Jersey is the fifth smallest state in the nation and contains a wide variety of land use types, water resources, geologic characteristics, and natural biota and fauna. Within the state's 7,836 square miles are sections of the Appalachian Mountains, 127 miles of coastline, large cities and industrial centers, rich crop-producing lands and a largely undeveloped Pinelands region. New Jersey has approximately 6,450 miles of rivers and streams, and 37.5 square miles (24,000 acres)of public lakes, reservoirs and ponds. In addition, there are 1,400 square miles of fresh and

saline marshes and wetlands, and 659 square miles of estuarine waters. A summary of the state's population and water resources is presented in Table II-1 below:

Table II-1: New Jersey Geographic Atlas

State Jurisdictional Surface Area:	8,919 sq. miles[1]
State Land Area:	7,793 sq. miles[2]
State Population (1990):	7,730,188
Major River Basins:	Upper Delaware/ Walkill, Lower Delaware, Passaic/Hackensack, Atlantic Coastal, Raritan
River Miles:	6,450[3]
Border River Miles:	310[3]
Number of Public Lakes/Reservoirs/Ponds:	380[3]
Square Miles of Estuaries/Bays:	659[4]
Ocean Coast as Linear Miles:	127
Square Miles of Freshwater Wetlands:	1,032[3]
Square Miles of Coastal/Tidal Wetlands:	380[3]

Notes:

[1] Includes coastal waters within New Jersey jurisdiction as shown on Figure II-2, based on the sum of 149 HUC-11 watersheds using 1986 Land Use/Land Cover GIS coverage.

[2] Excludes coastal waters within New Jersey jurisdiction as shown on Figure II-1, based on the sum of 5 Water Regions using 1986 Land Use/Land Cover GIS coverage.

[3] Approximate Figures

[4] Includes the Delaware River upstream to Big Timber Creek, the Hudson River up to the New Jersey/New York state line, Newark Bay upstream to the head of tide, the Raritan River upstream to approximately three miles above Lawrence Brook.

The five Water Regions in the state are shown on Figure II-1. These include the Upper Delaware/ Wallkill (1231 sq. miles), Lower Delaware (1872 sq. miles), Passaic/ Hackensack (953 sq. miles), Raritan (1284 sq. miles) and Atlantic Coastal (2453 sq. miles). Drainage areas cover New Jersey portions only.

The 5 Water Regions have been divided into 20 Watershed Management Areas (WMAs) for Management purposes, as shown on Figure II-1. Watershed Management Areas are comprised of several of New Jersey's 149 watersheds, which are shown on Figure II-2 and named on Table II-2. These 149 HUC-11 watersheds are part of a national system of watershed based hydrologic units (HUCs) developed by the United States Geological Survey, United States Soil Conservation Service and the US Environmental Protection Agency.

Surface Water Resources: New Jersey's surface waters provide habitat and food for numerous species of wildlife and are an important source of drinking water and food for residents. Over 173 million pounds of fish and 75 million pounds of shellfish are harvested from New Jersey's coastal waters each year. Fishing, swimming and boating are favorite pastimes and are important to the tourism industry. Tourism in New Jersey's coastal counties is a $12 billion industry that employs hundreds of thousands of people. Clearly, clean water is important economically and ecologically to

the well-being of New Jersey.

Surface water quality has remained excellent in undeveloped areas such as the Pinelands and Delaware Water Gap. Populations of shad in the Delaware River have improved from 150,000 in 1976 to almost 800,000 in 1996 as the water has become cleaner and dissolved oxygen levels have improved. Recently, 17 streams have been upgraded to Trout Maintenance or Trout Production due to improvements in water quality. Trout production and maintenance watersheds are shown on Figures II-3 and II-4, respectively.

About 87% of available shellfish beds are available for harvesting, due to point and nonpoint source pollution control efforts. Notably, effective pollution control programs have allowed the shellfish industry to thrive once more in the Navesink River in Monmouth County (WMA 12). Beach closings due to pollution are far less frequent than in the past because of improvements in sewage treatment, infrastructure and shoreline maintenance. Prior to 1991, 450 dry tons of sewage was dumped in the ocean per day. Today, over 60% of sewage sludge is beneficially used to fertilize crops, support landscaping and reclaim damaged lands, due to successful efforts to prevent toxics from tainting the sludge. Much of this progress is the result of the $5 billion spent since 1972 to improve sewage treatment. Through an advanced pretreatment program, significant improvements have been made to prevent or reduce industrial pollution and to improve treatment of industrial wastewater.

Despite these significant improvements, many watersheds are affected by one or more water quality issues. Surface water quality issues of concern include eutrophic conditions in lakes and estuaries caused by nutrient enrichment. Streams and bathing beaches may be affected by pathogenic contamination, resulting in beach closings. Some locations are being affected by metals and organics in sediments and biota and potentially, metals in water. In some waterbodies, water quality issues impair human uses of water for recreation, impair ecological health, and limit the availability of fish and shellfish for harvest. Additionally, historical losses of wetlands and other habitat alterations have negatively affected ecological health and water quality, and may cause flooding.

Ground Water Resources: Ground water is the source of water that provides flows to streams and water levels in lakes and wetlands, particularly during dry weather conditions. It provides approximately 40 percent of the state's potable water, with 31 percent coming from public-supply wells and 9 percent from domestic-supply wells (Hoffman and Mennel, 1997). Therefore, the quality of ground water directly affects the quality of drinking water supplies and aquatic biota. This is of particular significance in the New Jersey coastal plain, where up to ninety percent of the base flow to these streams is from ground water sources. The available data suggest that at present there is an ample supply of good quality ground water in the State of New Jersey. However, ground-water quantity (and quality) problems are usually concentrated in areas with the greatest demand for ground water use. New Jersey maintains regulations and programs aimed at protecting this resource.

Key ground water issues include the presence of volatile organic chemicals, metals, and synthetic organic chemicals which may be present in ground water at some locations in concentrations that are detrimental to human health. Elevated levels of nitrates and naturally occurring radioactivity have been found in some areas. Microbial contamination, which occurs in some areas, is of concern when ground water is used for human consumption.

New Jersey's 7.7 million residents rely on surface and ground water resources to supply about 15 billion gallons per day water for drinking water, domestic, industrial and agricultural uses. Although statewide water resources are sufficient to address water supply needs, local deficits occur, and these deficits may worsen as population and demand for water increase. In some coastal areas, saltwater intrusion limits potable use of ground water supplies and overuse of ground water has lead to the designation of two critical areas. Land development, and associated impervious surfaces, have reduced aquifer recharge and increased surface runoff. More than half of the water used in the State is used only once due to discharge of treated wastewater to tidal waters.

Water diversions are so great that the state's three largest rivers, the Delaware, Passaic and Raritan Rivers, all have minimum passing flow requirements. Diversion of stream flow for potable water supply, industrial processes and cooling purposes, agricultural irrigation, and maintenance of reservoir/ impoundment water levels is common throughout the state. NJDEP's Bureau of Water Allocation, as mandated in the State Water Supply Management Act (N.J.S.A. 58A:1 et seq.), requires water diversion permits for all withdrawals of more than 100,000 gallons per day.

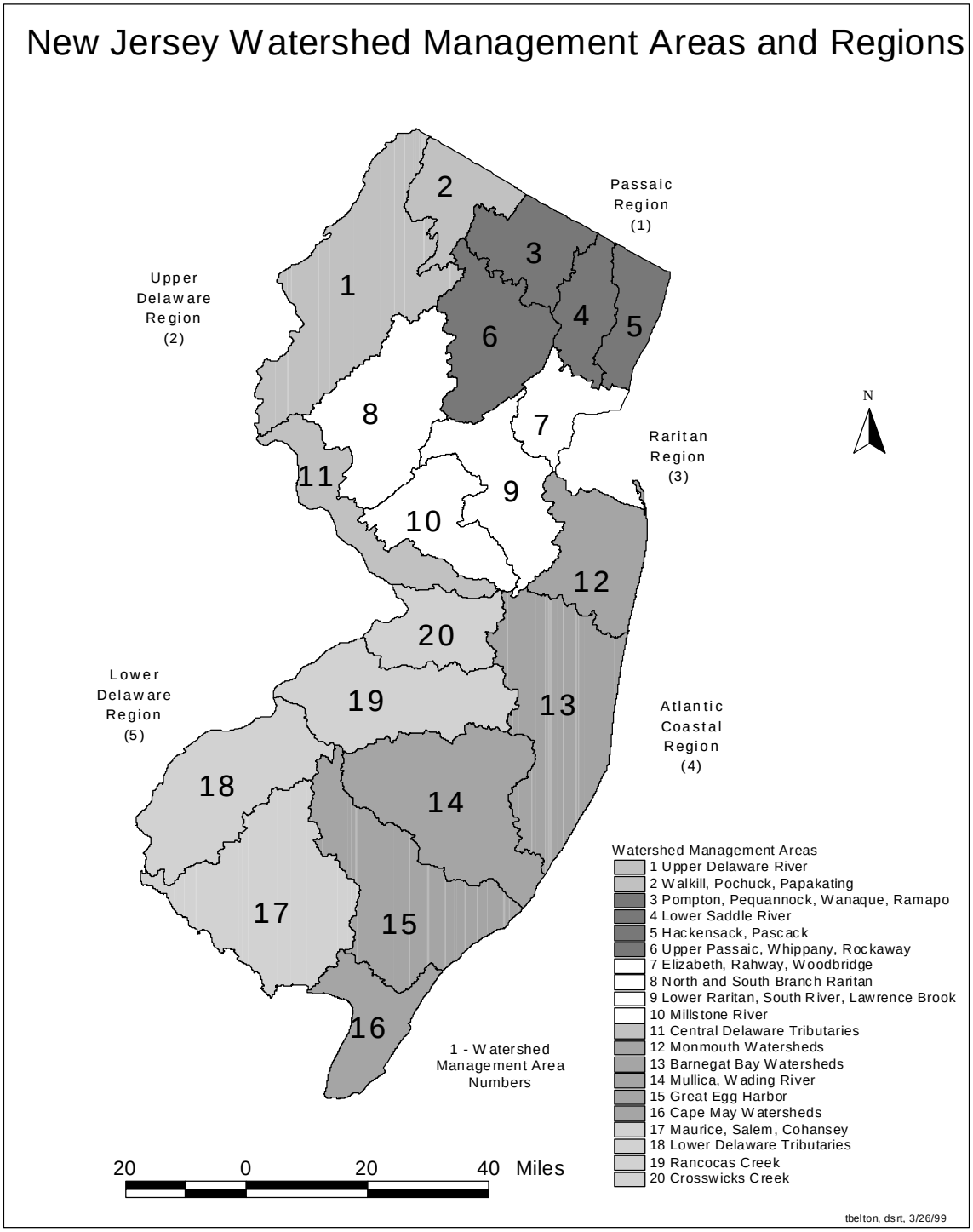
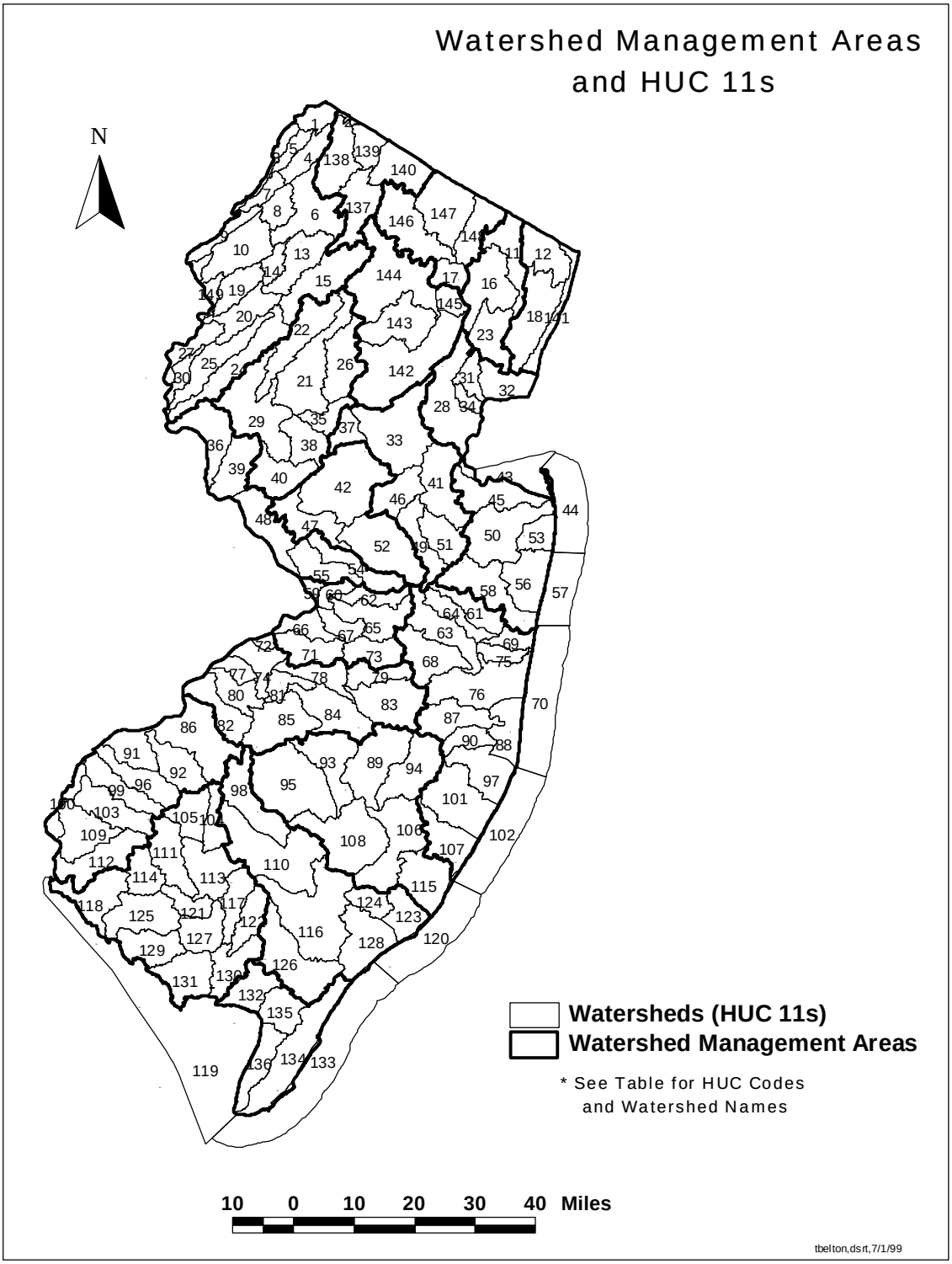


Figure II-1: New Jersey Water Regions and Watershed Management Areas

Figure II-2: Watershed Management Areas and HUC-11 Watersheds



New Jersey Watershed Names, HUC-11 Numbers and Areas

WS #	Watershed Name	HUC11	Area (sq/mi)
1	Shimers Brook/Clove Brook	02040104090	22.861
2	Rutgers Creek tribs.	02020007025	3.178
3	Walpack Bend/Montague Riverfront	02040104110	18.014
4	Big Flat Brook	02040104140	32.577
5	Little Flat Brook	02040104130	16.778
6	Paulins Kill (above Stillwater Village)	02040105040	79.355
7	Flat Brook	02040104150	16.871
8	Trout Brook/Swartswood Lake	02040105030	27.779
9	Van Campens Brook/Dunnfield Creek	02040104240	23.287
10	Paulins Kill (below Stillwater Village)	02040105050	69.824
11	Saddle River	02030103140	51.431
12	Hackensack River (above Hirshfeld Brook)	02030103170	50.872
13	Pequest River (above/incl Bear Swamp)	02040105070	54.665
14	Bear Creek	02040105080	18.327
15	Musconetcong River (above Trout Brook)	02040105150	81.640
16	Lower Passaic River (Saddle to Pompton)	02030103120	75.836
17	Pompton River	02030103110	23.997
18	Hackensack R (below/incl Hirshfeld Brook	02030103180	85.117
19	Beaver Brook	02040105100	36.688
20	Pequest River (below Bear Swamp)	02040105090	47.423
21	Lamington River	02030105050	99.308
22	SB Raritan River (above Spruce Run)	02030105010	70.956
23	Lower Passaic River (Nwk Bay to Saddle)	02030103150	53.611
24	Musconetcong River (below/incl Trout Br)	02040105160	73.917
25	Pohatcong Creek	02040105140	58.155
26	NB Raritan River (above Lamington)	02030105060	63.963
27	Pophandusing Brook/Buckhorn Creek	02040105110	30.140
28	Rahway River/Woodbridge Creek	02030104050	101.136
29	SB Raritan River (3 Brdgs to Spruce Run)	02030105020	110.959
30	Lopatcong Creek	02040105120	17.816
31	Elizabeth River	02030104020	22.872
32	Newark Bay/Kill Van Kull/Upper NY Bay	02030104010	43.519
33	Lower Raritan R (Lawrence to Millstone)	02030105120	119.340
34	Morses Creek/Piles Creek	02030104030	11.988
35	NB Raritan River (SB to Lamington)	02030105070	25.550
36	Hakihokake/Harihokake/Nishisakawick Ck	02040105170	62.580
37	Lower Raritan River (Millstone to NB/SB)	02030105080	24.659
38	SB Raritan River (NB to Three Bridges)	02030105040	41.836
39	Lockatong Creek/Wickecheoke Creek	02040105200	54.374
40	Neshanic River	02030105030	55.728

WS #	Watershed Name	HUC11	Area (sq/mi)
41	Lower Raritan River (below Lawrence)	02030105160	73.248
42	Millstone River (below/incl Carnegie Lk)	02030105110	130.395
43	Raritan Bay/Sandy Hook Bay	02030104910	55.761
44	Atlantic Coast (Sandy Hook to WhalePond)	02030104920	88.190
45	Raritan/Sandy Hook Bay tributaries	02030104060	61.188
46	Lawrence Brook	02030105130	46.205
47	Stony Brook	02030105090	55.369
48	Alexauken Cr/Moore Cr/Jacobs Cr	02040105210	62.510
49	Manalapan Brook	02030105140	43.922
50	Navesink River/Lower Shrewsbury River	02030104070	92.066
51	Matchaponix Brook	02030105150	44.254
52	Millstone River (above Carnegie Lake)	02030105100	98.839
53	Shrewsbury River (above Navesink River)	02030104080	29.239
54	Assunpink Creek (above Shipetaukin Ck)	02040105230	47.761
55	Assunpink Creek (below Shipetaukin Ck)	02040105240	44.571
56	Whale Pond Bk/Shark R/Wreck Pond Bk	02030104090	60.721
57	Atlantic Coast (Whale Pond to Manasquan)	02030104930	64.722
58	Manasquan River	02040301010	82.400
59	Duck Creek/Shady Brook	02040201030	8.230
60	Crosswicks Creek (Lower)	02040201070	15.138
61	North Branch Metedeconk River	02040301020	38.261
62	Doctors Creek	02040201060	25.943
63	Toms River (above Oak Ridge Parkway)	02040301060	60.266
64	South Branch Metedeconk River	02040301030	30.814
65	Crosswicks Ck (Doctors Ck to New Egypt)	02040201050	57.023
66	Crafts Creek	02040201090	28.947
67	Blacks Creek	02040201080	23.400
68	Union/Ridgeway Branch (Toms River)	02040301070	63.133
69	Metedeconk River	02040301040	20.579
70	Atlantic Coast (Manasquan to Barnegat)	02040301910	139.025
71	Assiscunk Creek	02040201100	45.942
72	Burlington/Edgewater Park Delaware tribs	02040201110	7.145
73	Crosswicks Creek (above New Egypt)	02040201040	41.229
74	Rancocas Creek	02040202080	36.561
75	Kettle Creek	02040301050	18.540
76	Lower Toms River/Barnegat Bay North	02040301080	98.627
77	Pompeston Creek/Swede Run	02040202090	18.781
78	NB Rancocas Creek (below New Lisbon dam)	02040202040	37.651
79	NB Rancocas Creek (above New Lisbon dam)	02040202020	32.123
80	Pennsauken Creek	02040202100	36.418
81	SB Rancocas Creek (below Bobbys Run)	02040202070	22.566

WS #	Watershed Name	HUC11	Area (sq/mi)
82	Cooper River	02040202110	51.285
83	Greenwood Branch (NB Rancocas Creek)	02040202030	78.191
84	SB Rancocas Creek (above Bobbys Run)	02040202050	68.617
85	Southwest Branch (SB Rancocas Creek)	02040202060	76.036
86	Woodbury/Big Timber/Newton Creeks	02040202120	98.940
87	Cedar Creek	02040301090	55.011
88	Central Barnegat Bay & Tribs	02040301100	43.777
89	West Branch Wading River	02040301190	87.075
90	Forked River	02040301110	25.959
91	Cedar Swamp/Repaupo Ck/Clonmell Ck	02040202140	41.014
92	Mantua Creek	02040202130	50.157
93	Basto River	02040301150	67.893
94	Oswego River	02040301180	72.553
95	Mullica River (above Basto River)	02040301160	127.334
96	Raccoon Creek/Birch Creek	02040202150	49.705
97	Oyster Creek/Barnegat Bay South	02040301120	60.016
98	Great Egg Harbor R(above Hospitality Br)	02040302030	71.057
99	Oldmans Creek	02040206010	45.991
100	Pennsville/Penns Grove tribs	02040206020	20.824
101	Manahawkin/Upper Little Egg Harbor tribs	02040301130	87.908
102	Atlantic Coast (Barnegat to Little Egg)	02040301920	121.603
103	Salem River (above Rt 540)	02040206030	57.531
104	Scotland Run	02040206130	29.834
105	Still Run/Little Ease Run	02040206120	41.564
106	Mullica River (GSP bridge to Turtle Ck)	02040301200	95.710
107	Lower Little Egg Harbor Bay tribs	02040301140	53.766
108	Mullica River (Turtle Ck to Basto River)	02040301170	109.997
109	Salem River (below Rt 540)	02040206040	59.689
110	Great Egg Harbor R(Lk Lenape to Hosp Br)	02040302040	133.483
111	Muddy Run	02040206150	57.888
112	Alloway Creek	02040206060	67.882
113	Maurice River (above Sherman Ave Bridge)	02040206140	61.354
114	Cohansey River (above Sunset Lake)	02040206080	37.410
115	Great Bay/Mullica R (below GSP bridge)	02040301210	64.636
116	Great Egg Harbor R(below Lake Lenape)	02040302050	142.253
117	Manantico Creek	02040206180	39.224
118	Stow Creek/Hope Creek	02040206070	64.819
119	Delaware Bay (Cape May Pt to Alloway Ck)	02040204910	356.652
120	Atlantic Coast (Little Egg to Great Egg)	02040302910	113.037
121	Maurice River (Union Lk to Sherman Ave)	02040206160	25.031
122	Manamuskin River	02040206190	36.190

WS #	Watershed Name	HUC11	Area (sq/mi)
123	Reeds Bay/Absecon Bay & tribs	02040302010	39.324
124	Absecon Creek	02040302020	26.432
125	Cohansey River (below Cornwell Run)	02040206090	69.779
126	Tuckahoe River	02040302070	102.361
127	Maurice River (Manantico Ck to Union Lk)	02040206170	44.632
128	Patcong Creek/Great Egg Harbor Bay	02040302060	71.042
129	Back/Cedar/Nantuxent Creeks	02040206100	51.062
130	Maurice River (below Manantico Creek)	02040206200	48.926
131	Dividing Creek	02040206110	60.130
132	West Creek/East Creek/Riggins Ditch	02040206210	45.340
133	Atlantic Coast (Great Egg to CapeMay Pt)	02040302920	217.961
134	Cape May Bays & Tribs East	02040302080	103.202
135	Dennis Creek	02040206220	41.170
136	Cape May Tribs West	02040206230	45.218
137	Wallkill River (above road to Martins)	02020007010	61.022
138	Papakating Creek	02020007020	60.624
139	Wallkill River (below road to Martins)	02020007030	28.875
140	Pochuck Creek	02020007040	54.303
141	Hudson River	02030101170	29.020
142	Upper Passaic River (above Pine Bk br)	02030103010	143.162
143	Whippany River	02030103020	69.639
144	Rockaway River	02030103030	136.811
145	Middle Passaic R (Pompton to Pine BR br)	02030103040	19.484
146	Pequannock River	02030103050	86.834
147	Wanaque River	02030103070	79.177
148	Ramapo River	02030103100	47.794
149	Stony Brook/Delawanna Creek	02040105060	19.641

Trout production

Trout maintenance

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